Bull. Mus. natl. Hist. nat., Paris, 4e sér., **13**, 1991,
section B, *Adansonia*, nos 1-2 : 13-15.

Leaf anatomy of *Balgoya pacifica* (*Polygalaceae*) from new Caledonia

P. Baas

Summary : The leaf anatomy of *Balgoya pacifica* Morat & Meijden confirms the placement of this species in the *Polygalaceae* trib. *Moutabeeae*.

Résumé : L'anatomie foliaire de *Balgoya pacifica* Morat & Meijden confirme l'appartenance de ce taxon à la famille des *Polygalaceae*, trib. *Moutabeeae*.

Pieter Baas, Rijksherbarium/Hortus Botanicus, P.O. Box 9514, 2300 RA Leiden, The Netherlands.

In order to establish the affinities of *Balgoya* (Morat & Meijden, 1991), its leaf anatomy was also studied in detail. The leaf anatomical diversity in the *Polygalaceae* is fairly well known, especially thanks to the accounts in Metcalfe & Chalk (1950), Dickison (1973) and Styer (1977).

Material studied. — *MacKee 24667* ; *McPherson 1745, 3394.*

In surface view. — Slender unicellular (or by septation uniseriate) hairs sparse and restricted to the lower side of the midrib. Cuticle smooth. Anticlinal epidermal cell walls straight to curved. Stomata confined to lower leaf surface, cyclocytic with (4-)5(-6) subsidiary cells (Fig. 1), sometimes tending to anomocytic or anisocytic. Guard cell pairs (29-)31(-35) μm long and (22-)24(-26) μm wide. Epidermal cell pattern only modified over midrib and major veins.

In transverse section. — Lamina dorsiventral, 230-310 μm thick. Adaxial cuticle ca. 10 μm, abaxial cuticle ca. 6 μm thick. Unspecialized epidermal cells square to flattened rectangular or less regularly shaped, abaxially usually larger than adaxially. Stomata level with the leaf surface, with very prominent outer cuticular ledges and small but distinct inner ledges. Adaxial hypodermis (or inner part of multiple epidermis, see discussion) usually of 2, occasionally of 1 layer of translucent parenchyma cells ; an abaxial hypodermis of one cell layer also present but less clearly differentiated from the chlorenchyma ; in *MacKee 24667* occasionally intersparsed with isolated cells with weakly thickened sclerified walls. Mesophyll composed of one (to two) layers of adaxial palisade cells and central and abaxial spongy tissue. Midrib adaxially slightly, abaxially prominently raised, provided with an almost closed vascular system built of an abaxial crescentiform and a flattened adaxial collateral bundle (or several grouped individual bundles) ; the entire system sheathed by sclerenchyma fibres and

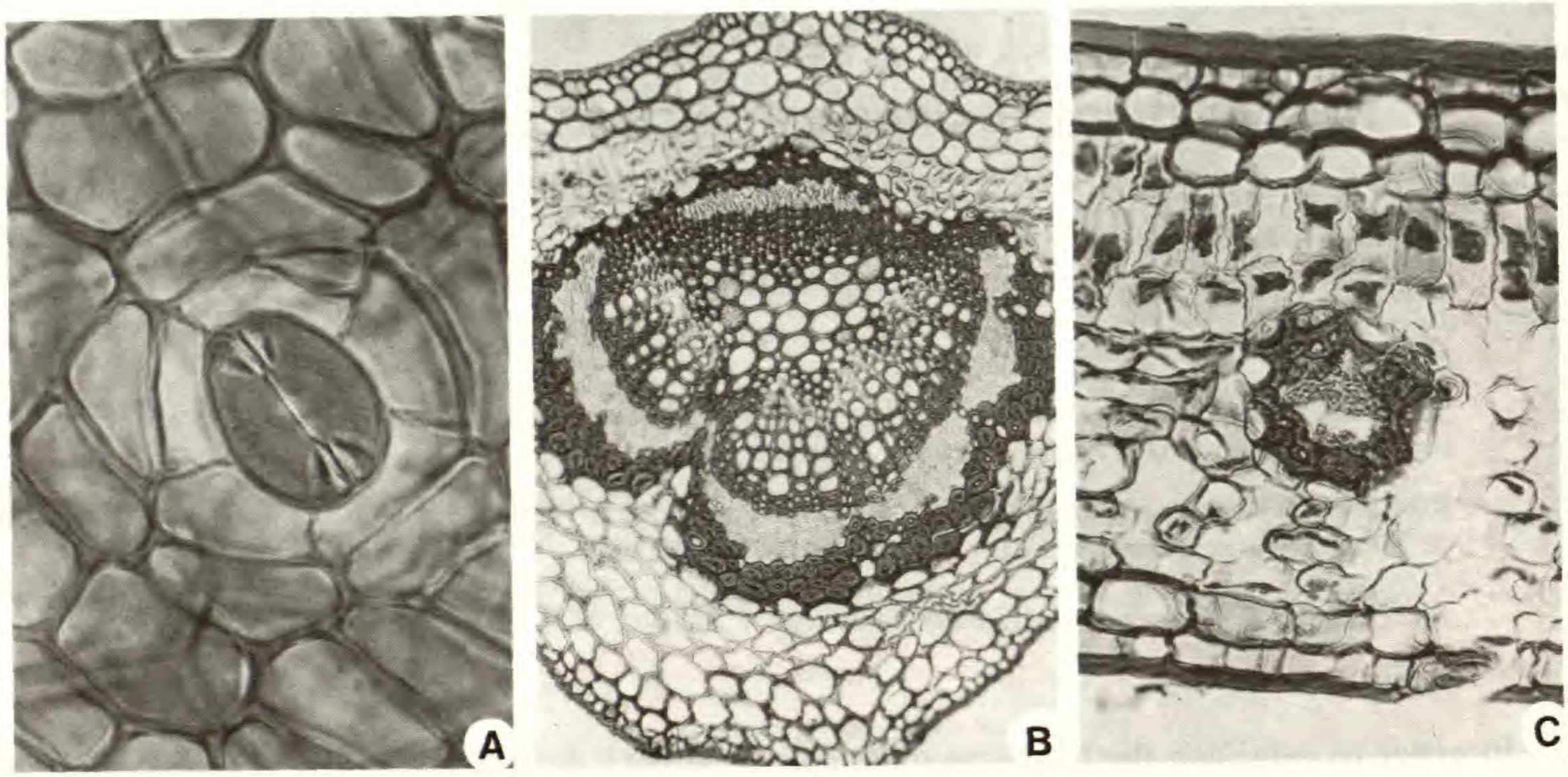

Fig. 1. — **Balgoya pacifica** Morat & Meijden, leaf anatomy : **A**, cyclocytic stoma in lower epidermis × 500 (*McPherson 3394*) ; **B**, midrib in transverse section × 80 (*McPherson 1745*) ; **C**, lamina ; note upper and lower hypodermis, embedded vein with outer bundle sheath of cells with unilaterally thickened walls × 200 (*McPherson 3394*).

outer bundle sheath cells with unilaterally thickened and lignified inner walls, sometimes containing crystals. Ground tissue of midrib collenchymatous but interrupted adaxially by continuous palisade tissue. Vascular bundles of major and minor veins embedded in mesophyll, mostly (except the smallest veins) also sheathed by fibres, and always with outer bundle sheath cells, often crystalliferous, with unilaterally thickened and sclerified walls.

Petiole with a closed vascular system (derived from a deeply crescentiform abaxial arc and a more flattened adaxial plate) and additional latero-dorsal wing bundles.

Crystals solitary (and prismatic) or irregularly clustered, almost entirely confined to outer bundle sheath cells with sclerified inner walls, occasionally also present in peripheral ground tissue of the petiole (in *MacKee 24667*).

DISCUSSION : COMPARISON WITH OTHER POLYGALACEAE.

The leaf anatomy of *Balgoya* is very similar to that of the genera of *Moutabeeae* described in detail by STYER (1977). Shared characters include :

— midrib and secondary vein anatomy ;

— the outer bundle sheath cells with unilateral inner wall thickenings identical to *Balgoya* in all genera except in *Moutabea* where the outer walls are thickened instead ;

— mesophyll structure ;

— an adaxial hypodermis (referred to as a multiple epidermis by STYER (*l.c.*), but without ontogenetic studies, and for lack of a clear mother/daughter cell relationship in mature leaves, the term hypodermis is preferred here as a technical term of convenience) ;

— well-developed outer cuticular ledges.

Barnhardtia and *Dicridanthera*, in particular, are very similar to *Balgoya* ; some of the shared characters are by no means very common throughout the *Polygalaceae* or the Dicotyledons as a whole, and may well be considered as synapomorphies, reflecting phylogenetic affinity of these three genera. The only more or less unique features of *Balgoya* within the *Moutabeeae* are the cyclocytic stomata (anomocytic in the other genera, but sometimes also present and intergrading with the predominant cyclocytic type in *Balgoya*) and the weak development of an abaxial hypodermis. These confirm the generic identity of *Balgoya*.

Within the *Polygalaceae, Balgoya* is much more similar in its leaf anatomy to the *Moutabeeae* than to the *Polygaleae* (cf. SOLEREDER, 1899, 1908 ; METCALFE & CHALK, 1950) or the *Xanthophylleae* (cf. DICKISON, 1973).

REFERENCES

DICKISON, W. C., 1973. — Nodal and leaf anatomy of *Xanthophyllum* (*Polygalaceae*). *Bot. J. Linn. Soc.* 67 : 103-115.

METCALFE, C. R. & CHALK, L., 1950. — *Anatomy of the Dicotyledons*. Clarendon Press, Oxford.

MORAT, Ph. & MEIJDEN, R. VAN DER, 1991. — *Balgoya* (*Polygalaceae* trib. *Moutabeeae*), a new genus from New Caledonia. *Bull. Mus. natl. Hist. nat.*, Paris, 4^{e} sér., 13, sect. B, *Adansonia*, n^{os} 1-2 : 3-8.

STYER, C. H., 1977. — Comparative anatomy and systematics of the *Moutabeeae* (*Polygalaceae*). *J. Arnold Arbor.* 58 : 109-145.

SOLEREDER, H., 1899 & 1908. — *Systematische Anatomie der Dicotyledonen & Ergänzungsband*. Enke, Stuttgart.